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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
Before the Board of Patent Appeals and Interferences

In re Patent Application of

ARNESS et al

Serial No. 10/829,281

Filed: April 22, 2004

Title: TURBINE AIRFOIL TRAILING EDGE REPAIR AND METHODS THEREFOR



Atty Dkt. MJK-839-1549

C# M#

Confirmation No. 7255

TC/A.U.: 1775

Examiner: J. J. Zimmerman

Date: June 2, 2008

**Mail Stop Appeal Brief - Patents**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Correspondence Address Indication Form Attached.

**NOTICE OF APPEAL**

Applicant hereby appeals to the Board of Patent Appeals and Interferences from the last decision of the Examiner twice/finally rejecting \$510.00 (1401) / \$255.00 (2401) \$ applicant's claim(s).

- An appeal BRIEF is attached in the pending appeal of the above-identified application \$510.00 (1402) / \$255.00 (2402) \$ 510.00
- Credit for fees paid in prior appeal without decision on merits -\$ ( )
- A reply brief is attached. (no fee)
- Petition is hereby made to extend the current due date so as to cover the filing date of this paper and attachment(s)  
One Month Extension \$120.00 (1251) / \$60.00 (2251)  
Two Month Extensions \$460.00 (1252) / \$230.00 (2252)  
Three Month Extensions \$1050.00 (1253) / \$525.00 (2253)  
Four Month Extensions \$1640.00 (1254) / \$820.00 (2254) \$
- "Small entity" statement attached.
- Less month extension previously paid on -\$ ( )
- TOTAL FEE ENCLOSED** \$ 510.00

**CREDIT CARD PAYMENT FORM ATTACHED.**

Any future submission requiring an extension of time is hereby stated to include a petition for such time extension. The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our **Account No. 14-1140**. A duplicate copy of this sheet is attached.

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NIXON & VANDERHYE P.C.

By Atty: Michael J. Keenan, Reg. No. 32,106

Signature:

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\* \* \* \* \*

June 2, 2008

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**APPEAL BRIEF**

Sir:

Appellants hereby appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner in an Office Action dated October 5, 2007, finally rejecting all of the claims remaining in the application. An appeal is therefore proper and timely.

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(I)      **REAL PARTY IN INTEREST**

The real party in interest is the assignee, General Electric Company of 1 River Road, Schenectady, NY 12345, by virtue of an assignment recorded in the USPTO on February 20, 2007 at Reel 018950, Frame 0594.

**(II)      RELATED APPEALS AND INTERFERENCES**

The appellants and the undersigned are not aware of any related appeals, interferences, or judicial proceedings (past or present), which will directly affect or be directly affected by, or have a bearing on the Board's decision in this appeal.

(III) **STATUS OF CLAIMS**

Finally-rejected claims 1-3 are pending, and are involved in this Appeal. Non-elected claims 4-10 have been cancelled. A copy of claims 1-3 is provided in Section VIII, "Claims Appendix."

**(IV)    STATUS OF AMENDMENTS**

There have been no amendments to the specification or claims since prior to the decision in the final Office Action of October 5, 2007. A Request for Reconsideration of that decision, filed December 13, 2007, was denied in an Advisory Action dated December 26, 2007.

**(V) SUMMARY OF CLAIMED SUBJECT MATTER**

The invention relates generally to repair of the trailing edge of an airfoil, and particularly to a repair coupon having a trailing edge cooling configuration for replacement of a damaged trailing edge portion of a nozzle airfoil for a gas turbine, along with a related method (claims to the method have been canceled as the result of a restriction requirement).

By way of brief background, it is known to repair damaged trailing edge portions of turbine airfoils with replacement trailing edge portions, or "coupons." Replacement coupons have been welded to the remaining leading and intermediate portions of an airfoil after the damaged trailing edge portions have been removed. Trailing edge coupons, however, have not heretofore been designed to extend the operating life of the turbine airfoil, since they have lacked the required cooling configurations.

Thus, there has been a need for a trailing edge coupon and associated method of repairing turbine airfoils which extend the operating life of the repaired nozzles beyond the life cycle of the nozzle airfoils originally provided in the turbine.

With reference now to the specification text and drawings, and with specific reference to independent claim 1, appellants have disclosed and claimed:

an article for repairing turbine nozzle segments 10 each having an airfoil 12 between inner and outer platforms 14, 16 (page 7, paragraph 16, lines 2-8; Fig. 2) with a trailing edge portion of the airfoil removed (see Fig. 8) leaving intermediate and leading edge portions of the airfoil between the platforms comprising a trailing edge coupon 30 having pressure and suction side wall portions 32, 34 (page 9, paragraph 20, lines 8-12; Fig. 4); a plurality of film cooling holes 46 generally radially spaced one from the other along a pressure side wall portion of the coupon; the coupon including a trailing edge 36 having a plurality of radially spaced openings 44 connected to a radially extending plenum 42 (page 9, paragraph 20, lines 17-22; Figs. 4, 5) ; and a plurality of radially spaced ribs 38 extending between opposite pressure and suction sides of the coupon, the ribs 38 shaped to form radially spaced flow channels for directing cooling air to the plenum 42 (page 9, paragraph 20, lines 9-16; Fig. 4); and wherein edges of the pressure and suction side wall portions are chamfered (see 54, 56 in Fig. 4) for welding to pressure and suction side wall portions 32, 34 of the intermediate portion of the airfoil (page 4, paragraph 5, lines 1-6; paragraph 6, lines 27-30; Figs. 4 and 9).

Claim 2 further requires that holes 46 are generally cylindrical and flared by tapered portions 48 of the pressure side wall portion of the coupon for distributing air substantially from the holes over downstream surfaces of the pressure side wall

portion, enabling film cooling of substantially the entirety of the trailing edge portion of the coupon downstream of the holes (paragraph 21, lines 7-13; Figures 5 and 6).

Dependent claim 3 requires the number of the openings 44 exceed the number of the film cooling holes 46 by a factor of at least two (original claim 3; Fig. 5).

**(VI) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

**(1) The rejection of claims 1-3 under 35 U.S.C. § 103(a) as unpatentable over applicants' disclosure of prior art (pages 1-3) in view of Williams (U.S. Patent 2,657,902), Beeck (U.S. Published App. No. 2001/0012484) and Field (U.S. Patent 4,672,727).**

**(2) The rejection of claims 1-3 under 35 U.S.C. §103(a) as unpatentable over applicants' disclosure of prior art (pages 1-3) in view of Jackson (U.S. Published App. No. 2002/0197152), Jackson (U.S. Published App. No. 2003/0082048) or Mendham (U.S. Patent No. 5,269,057) in view of Williams (U.S. Patent No. 2,657,902), Beeck (U.S. Published App. No. 2001/0012484) and Field (U.S. Patent 4,672,727).**

**(VII) ARGUMENT**

The USPTO has the initial burden of factually supporting any conclusion of *prima facie* obviousness (35 USC 103) with respect to the claimed invention. See *In re Rineheart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992); *In re Kahn*, 441 F.3d 977 (Fed. Cir. 2006). In its recent decision, the U.S. Supreme Court in

*KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (April 2007), held that it is often necessary for a court to look to interrelated teachings of multiple patents, the effects of demands known to the design community or present in the marketplace and the background knowledge possessed by a person of ordinary skill in the art in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. The Supreme Court held that “[t]o facilitate review, this analysis should be made explicit.” *Id.* at 1396.

The Supreme Court in its *KSR* decision went on to say that it followed the Court of Appeals for the Federal Circuit’s advice that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness” (the Supreme Court quoting from the Court of Appeals for the Federal Circuit in *In re Kahn*, 78 USPQ2d 1329 (Fed. Cir. 2006)).

It is, of course, improper to use the inventors’ patent application as an instruction book on how to reconstruct the prior art. See *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d. 1561, 1 USPQ 2d 1593 (Fed. Cir. 1987).

**(1) The prior art as cited and combined by the Examiner in Section VI, (1) above fails to produce the claimed subject matter, and thus, the U.S.P.T.O. has failed to meet its burden of proof of establishing prima facie obviousness with respect to the claimed invention.**

The Examiner relies upon applicants’ discussion of prior repair techniques, acknowledging that replacement trailing edge coupons have been welded to the remaining

sections of the airfoil. The Examiner also relies upon the disclosure that airfoils have been constructed with a plurality of radially spaced apertures opening through the trailing edge in combination with radially spaced film cooling holes axially spaced from and adjacent the trailing edge. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the cooling hole configuration within a trailing edge coupon in order to increase the operation life of the airfoil.

The Examiner further relies upon Williams to show that it is conventional to chamfer the edges of an airfoil component to accommodate welding.

The Examiner further relies upon Beeck for showing that ribs are conventionally used between the pressure and suction sides of airfoils, and arranged so that cooling air flows between the ribs to a radial plenum, citing paragraph 25. Based on this disclosure, the Examiner contends that it would have been obvious to one of ordinary skill in the art to use the rib and radial plenum configuration of Beeck in a trailing edge coupon since such configurations are disclosed for the purpose of improving cooling characteristics.

The Examiner relies upon Field particularly with respect to claim 2, for teaching that flared cooling holes are known.

With regard to dependent claim 3, the Examiner contends that the subject matter thereof merely relates to an obvious optimization of the number of openings and film cooling holes for cooling efficiency.

Independent claim 1 requires the coupon trailing edge portion to have a plurality of radially spaced openings connected to a radially extending plenum. This is clearly shown in Figure 4, where the radially spaced passages 44 at the trailing edge of the coupon are

connected to the radial plenum 38. In addition, the claim requires that the radially spaced ribs extend between opposite pressure and suction sides of the coupon, and be shaped to form radially spaced flow channels for directing cooling air to the plenum 38.

In fact, none of the references cited by the Examiner disclose or suggest a combination of cooling openings connected to a radially extending plenum with ribs that form flow channels for directing air to the plenum. In Beeck, contrary to the Examiner's assertion, the exit passages 25 formed by choke ribs 24 do not connect to a radial plenum. Rather, the cooling air must negotiate a series of offset pins 20 designed to uniformly distribute the flow of cooling air in an axial direction, i.e., in a direction toward the trailing edge. The radial plenums 18 and 19 identified by Beeck are not connected to the exit passages 25.

Moreover, Beeck's disclosure is wholly unrelated to the design of repair coupons, and the Examiner has proffered no evidence or detailed rationale to support the conclusion that one skilled in the art would have incorporated the claimed cooling configuration into a repair coupon. In fact, none of Williams, Beeck or Field disclose anything with respect to the repair of trailing edge portions of airfoils. Thus, even if the references can be combined as proposed, the specific trailing edge coupon cooling configuration is not produced. Only by using appellants' application as a guide can the claimed invention be achieved.

Accordingly, the Examiner (and, hence, the USPTO) has failed to meet its burden of establishing *prima facie* obviousness and, therefore, the rejection should be reversed.

**(2) The prior art as cited and combined by the Examiner in Section VI, (2) above also fails to produce the claimed subject matter, and thus, the U.S.P.T.O. has failed to meet its burden of proof of establishing prima facie obviousness with respect to the claimed invention.**

Here, the Examiner relies on the acknowledged prior art, Williams, Beeck and Field, as discussed above. In addition, the Examiner relies upon Jackson '048, Jackson '152 or Mendham '057 for teaching that it is known to incorporate cooling holes into repair coupons.

Appellants' remarks above concerning the acknowledged prior art, Williams, Beeck and Field, apply equally as well here and are incorporated by reference.

Jackson '152 discloses a repair insert 60 (Fig. 6) formed with an array of cooling holes 35 and a cooling channel 25 (see Col. 6, 4 lines at bottom of the Col.);

Jackson '048 discloses repair inserts 45 (Fig. 9) with cooling holes 42, and a cooling channel 41.

Mendham discloses removing a trailing edge portion 14 in Fig. 7, with cooling holes 29 in the removed section. Mendham, does not, however, disclose any specific configuration for the repair coupon, except with respect to the coupling tabs 26, 27.

None of three additional references relied upon by the Examiner disclose or suggest a trailing edge repair coupon as recited in the claims of this application, particularly with respect to an internal cooling configuration within the repair coupon that includes a plurality of radially spaced ribs that provide flow channels for directing cooling air to the radially extending plenum.

It remains that none of the prior art references relied upon by the Examiner in this alternative ground of rejection, and including the acknowledged prior art discussed in applicants' own specification, discloses or suggests a repair coupon with the specific internal cooling configuration as required by independent claim 1, and therefore, this alternative ground of rejection should also be reversed. Dependent claims 2 and 3 are considered to stand or fall with independent claim 1 from which they depend.

### **CONCLUSION**

In conclusion, appellants have demonstrated that the Section 103 ground of rejection based on obviousness is improper for failure to provide sufficient factual evidence to support a conclusion of *prima facie* obviousness with respect to any of appealed claims 1-3. The Examiner has attempted to piece together various aspects of the prior art disclosures to arrive at the claimed invention. Not only has this attempt been grounded in impermissible hindsight, but the claimed invention is not produced by the combination without resort to even further unfounded hindsight reasoning that is nowhere supported by the prior art. Accordingly, reversal of the alternative grounds of rejection is requested.

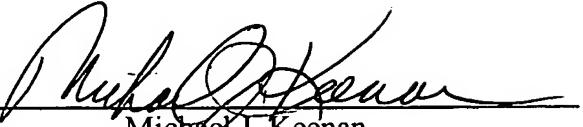
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Respectfully submitted,

**NIXON & VANDERHYE P.C.**

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**(VIII) CLAIMS APPENDIX**

1. 1. (Currently Amended) An article for repairing turbine nozzle segments each having an airfoil between inner and outer platforms with a trailing edge portion of the airfoil removed leaving intermediate and leading edge portions of the airfoil between the platforms comprising:

a trailing edge coupon having pressure and suction side wall portions;

a plurality of film cooling holes generally radially spaced one from the other along a pressure side wall portion of the coupon;

said coupon including a trailing edge having a plurality of radially spaced openings connected to a radially extending plenum;

a plurality of radially spaced ribs extending between opposite pressure and suction sides of the coupon, said ribs shaped to form radially spaced flow channels for directing cooling air to said plenum; and

wherein edges of the pressure and suction side wall portions are chamfered for welding to pressure and suction side wall portions of the intermediate portion of the airfoil.

2. (Original) An article according to claim 1 wherein the holes are generally cylindrical and flared by tapered portions of the pressure side wall portion of the coupon for distributing air substantially from the holes over downstream surfaces of the pressure side wall portion enabling film cooling of substantially the entirety of the trailing edge portion of the coupon downstream of the holes.

3. (Original) An article according to claim 1 wherein the number of the openings exceed the number of the film cooling holes by a factor of at least two.

4-10. (Canceled)

(IX)     1. EVIDENCE APPENDIX

None.

**(X)      RELATED PROCEEDINGS APPENDIX**

None.